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COMPLETE SPECIFICATION.

Improvements in Apparatus for Respiring in Foul Air.

We, ALEXANDER BERNHARD DRÄGER of Moislinger Allee, 53, Lübeck, Engineer, and Doctor LUDWIG MICHAELIS of Tegeler Strasse 15 Berlin, Manager, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement.

Our invention relates to improvements in apparatus for respiring in foul air, and the objects of the improvements are first to provide a sufficient supply of fresh air or oxygen for renewing the air inside the breathing mask or helmet; second to dispense with any far leading pipes or hoses for introducing the oxygen gas or fresh air; third to free the air inside the apparatus of the carbonic acid; fourth to produce a continuous circulation of the air inside the apparatus from the reservoir wherein the air is exhausted from the mouth and nose of the person protected by the apparatus through a regenerating device; fifth to facilitate breathing inside the apparatus; and sixth to keep the transparent part of the mask or helmet free from moisture.

We obtain these objects by the apparatus shown in the accompanying drawings in which:—

Figure 1 is a back view of a person provided with our improved apparatus, and

Figure 2, is a front view of the same:

Figures 3, 4 5 and 6 are detailed views of the respiring mask or helmet on a larger scale, Figure 3 being the front elevation, Figure 4 the side elevation, Figure 5 the top view and Figure 6 the back view;

Figure 7 is a sectional side elevation of the nozzle for mixing compressed oxygen or air with the air leaving the regenerating device.

Similar letters refer to similar parts throughout the several views.

Our improved apparatus is especially suited for protecting firemen, miners and other persons who, in case of accidents, have to enter and to remain in rooms or in mines where the air is irrespirable by smoke or gas. The principal features of the apparatus are a reservoir containing a supply of compressed air or oxygen gas which is fastened to the man's body by means of a bearing device, a mask or helmet which protects the man's respiratory organs, (nose and mouth), and which is provided with an impermeable bag for the reception of the exhausted air as well as of the regenerated air, and a regenerator supplied with chemicals which retain the expired carbonic acid.

The mask or helmet A kept in proper position on the head by means of a strap a is composed of an oval ring a^2 and a projection a^1 provided with mica or glass plates a^3. To tighten the ring a^2 round the man's head and face we make use of a rubber hose a^4, such as employed in bicycle tyres, which is blown up by means of a tube a^5 attached in convenient position for the mouth and connected with the tightening hose a^4 by the tube a^6 and screw valve a^7. A bow a^8 is hinged at both sides to the projection a^1 and supports a bag a^9 made of impermeable material. This bag a^9 serves to receive the products of breathing and also the purified air. The latter is introduced by the tube b attached at the one end to the branch c of the injecting nozzle C, while the other end is fastened to the nose nozzle b^1 of the pipe b^2. The pipe b^2 pierced with small

holes is placed just above the mica or glass plates a^3, thus the fresh air which is dry and free from moisture prevents the plates a^3 from getting moist inside. The products of respiration are drawn away by means of the pipe d^2 placed round the lower end of the ring a^2, the nozzle d^1 and the tube d the other end of which is attached to the regenerator F. The regenerator F is a receptacle filled with soda lime, caustic soda or other matter capable of absorbing the expired carbonic acid.

To obtain a continuous circulation of the air enclosed in the mask or helmet A through the regenerator F and to replace at the same time the oxygen gas absorbed in its passage through the lungs we make use of a supply of oxygen gas compressed in the vessels G and of the power produced by the expanding oxygen gas when leaving the vessels. Both vessels G are provided with screw valves g^1 and connected by a pipe g. A reduction valve e reduces the pressure of the passing gas to about five atmospheres; a manometer k shows the degree of pressure. The oxygen gas enters through the tube e^1 into the fine channel c^3 of the branch c^2 of the nozzle C. The reduced end of the channel c^3 is situated opposite the end of the passage c^4 of the branch c; thus the current of gas enters with full power into the passage c^4 and draws along the air contained in the branch c^1. As the latter is coupled by the tube f to the regenerator F, a constant circulation of air is produced from the bag a^9 through the regenerator F and by means of the tube b back to the helmet or mask A.

The regenerator F, the vessels G, the manometer and the other fittings are fastened on to a bearing plate H attached to the back of the miner or fireman by means of straps h.

Instead a supply of compressed oxygen gas, compressed air may be used.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. In apparatus for respiring in foul air a mask or helmet provided with an impermeable bag, in combination with a reservoir containing compressed oxygen gas or air, a regenerator filled with chemicals absorbing carbonic acid, and an injecting nozzle, substantially as set forth.

2. In apparatus for respiring in foul air the combination of the ring a^2 and the projection a^1 with the bag a^9, substantially as and for the purpose specified.

3. In apparatus for respiring in foul air the combination of the ring a^2 with the hose a^4 and a^5, the pipe a^6 and the valve a^7, substantially as and for the purpose specified.

4. In apparatus for respiring in foul air the combination of a pipe (b^2) for introducing fresh or regenerated air, arranged above the transparent plates of the mask or helmet with another pipe (d^2) arranged below the respiratory organs, substantially as specified.

5. In apparatus for respiring in foul air the combination of the branch c^2 provided with a narrow channel c^3, and the branch c provided with a wide channel c^4 opposite the fine opening of channel c^3, with the branch c^1 connected with the regenerator F; substantially as and for the purpose specified.

Dated this 14th day of October 1901.

PHILLIPS & LEIGH,
22, Southampton Buildings, Chancery Lane, London, W.C.
Agents for the Applicants.

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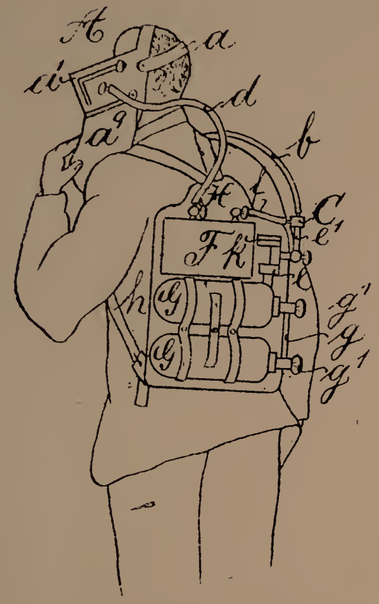

Fig. 1.

Fig. 2.

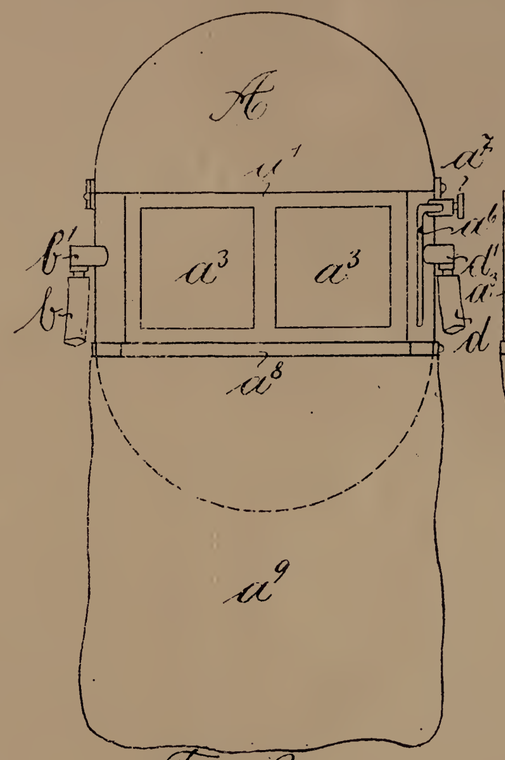

Fig. 3.

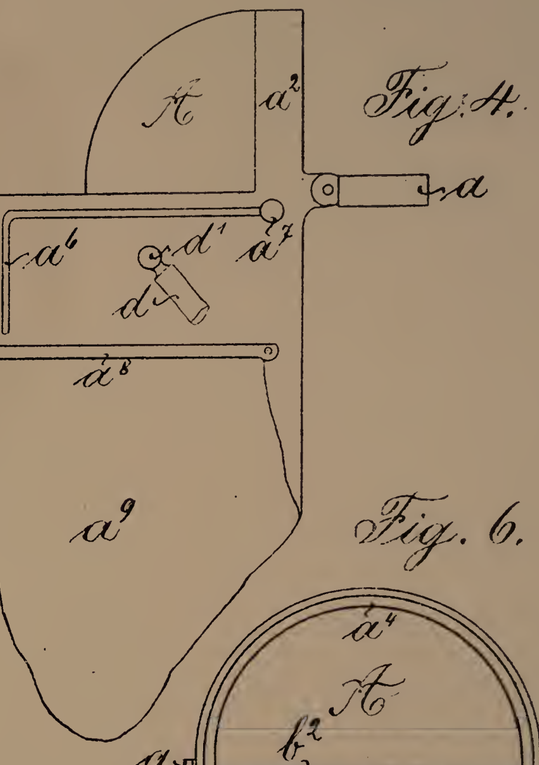

Fig. 4.

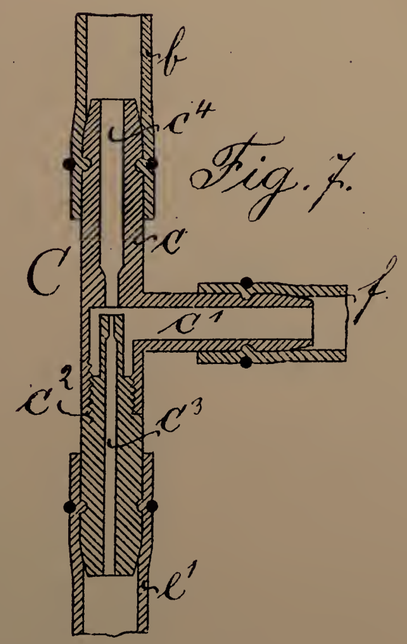

Fig. 7.

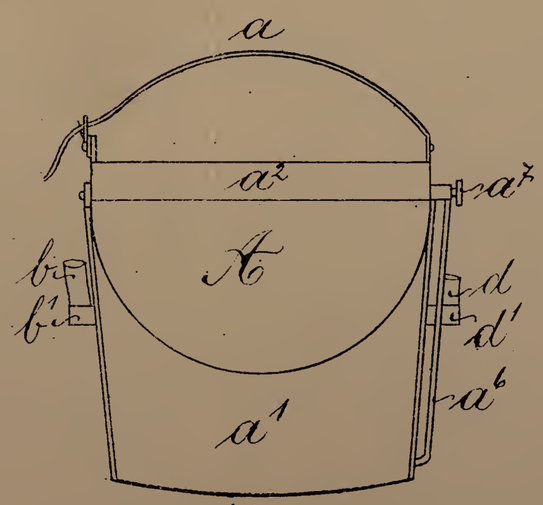

Fig. 5.

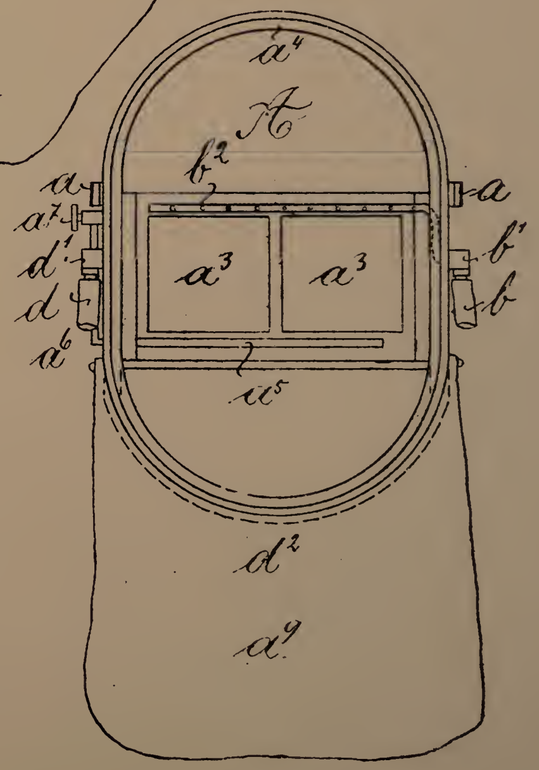

Fig. 6.

This Drawing is a reduction of the Original on a reduced scale.

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